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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	09/640,519
	Filing Date	August 17, 2000
	First Named Inventor	Hiroaki NAKAOKA et al.
	Group Art Unit	2818
	Examiner Name	D. Vu
Total Number of Pages in This Submission		Attorney Docket Number 740819-408

ENCLOSURES (check all that apply)		
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Firm or Individual name	<u>Donald R. Studebaker, Reg. No. 32,815</u> Nixon Peabody LLP 8180 Greensboro Drive Suite 800 McLean, VA 22012
Signature	
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#12

PATENT
740819-408

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT application of:

Hiroaki NAKAOKA et al

Application No.: 09/640,519

Filed: August 17, 2000

For: METHOD OF FABRICATING SEMICONDUCTOR

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) Art Unit: 2818
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) Examiner: David VU
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REQUEST FOR RECONSIDERATION

Commissioner for Patents
Washington, D.C. 20231

June 12, 2002

Dear Sir:

In response to the Official Action dated March 14, 2002, applicant hereby request that the rejection set forth therein be reconsidered and withdrawn by the Examiner for at least the reasons set forth herein below. Claims 1-10 are presently pending in the instant application.

With reference to the Official Action and particularly page 2 thereof, claims 1, 4-7, 9 and 10 have been rejected under 35 U.S.C. §103(a) as being anticipated by U.S. Patent No. 5,144,071 issued to Gardner et al. in view of U.S. Patent No. 6,211,003 issued to Tanaguchi et al. and further in view of U.S. Patent No. 5,817,562 issued to Chang et al. This rejection is respectfully traversed in that the combination proposed by the Examiner neither discloses nor remotely suggest that which presently set forth by applicant's claimed invention.

Initially, applicant notes that the Examiner states: that in claims 1, 4-7, 9 and 10 have been rejected as being anticipated by several references under 35 U.S.C. §103(a). As the Examiner can readily appreciate, such a standard is clearly erroneous. Consequently, the applicant assumes the Examiner is of the opinion that the claimed invention to be unpatentable in view of the proposed combination rather than anticipated thereby.

In reference to the present invention and particularly claim 1, this claim recites a method of fabricating a semiconductor device, with the method including the steps of forming a silicon oxynitride film on a silicon substrate, performing a heat treatment while keeping a surface of the silicon oxynitride film in contact with a gas containing nitrogen to introduce at least nitrogen into the silicon oxynitride film, after this step, forming a semiconductor film containing an impurity of first conductivity type on the silicon oxynitride film. Subsequently forming a gate electrode composed of the semiconductor film by patterning the semiconductor film and, following this step, forming a gate insulating film composed of the silicon oxynitride film by patterning the silicon oxynitride film. Consequently, according to the present invention a silicon oxynitride film is formed on a substrate and thereafter a heat treatment is performed while keeping a surface of the silicon oxynitride film in contact with a gas containing nitrogen in order to introduce at least nitrogen into the silicon oxynitride film.

Accordingly, significant nitrogen distribution in the silicon oxynitride film can be achieved and a high additional concentration of nitrogen can thus be introduced. Hence, the penetration of boron and the short channel effects can be effectively suppressed, and the high driving force of the transistor can be maintained.

With respect to the prior art cited by the Examiner, U.S. Patent No. 6,144,071 issued to Gardner, et al. teaches a step of performing a silicon oxynitride film 22 on a semiconductor 20, a step of forming a gate conductor 23 on the silicon oxynitride film 22 by patterning the polysilicon layer, and a step of forming a gate dielectric 22 by patterning the silicon oxynitride film 22. As readily appreciated by the Examiner, the Gardner reference fails to disclose or even suggest introducing at least nitrogen into the silicon oxynitride film. In this regard, the Examiner relies on the teachings of U.S. Patent No. 6,211,003 issued to Tanaguchi et al. Wherein the Examiner asserts that this reference teaches that a heat treatment is performed, while keeping a surface of the silicon oxynitride film in contact with a gas containing nitrogen in order to introduce at least nitrogen into silicon oxynitride film. However, it is respectfully submitted that such description and disclosure in the Tanaguchi et al. reference is nowhere to be found.

As is set forth in col. 19, lines 15-33, of the Tanaguchi et al reference, Tanaguchi et al discloses that during a film forming process by oxidizing a gate insulating film 11i, nitrogen is introduced into the gate insulating film 11i by performing a high temperature heat treatment in a gas atmosphere of NH_3 or NO_2 . This relates to a method of forming a silicon oxynitride film and corresponds to the step a) of the present invention, that being the forming of the silicon

oxynitride film. Hence, the method set forth by Tanaguchi et al merely forms a silicon oxynitride film wherein nitrogen is introduced by performing a high temperature heat treatment in a gas atmosphere of NH_3 or NO_2 during a film performing process by oxidation. Therefore, it is respectfully submitted that Tanaguchi et al only discloses a method of forming the silicon oxynitride film and fails to disclose introducing at least nitrogen into the silicon oxynitride film subsequent to its formation as is specifically recited by applicant's claimed invention.

With respect to the teachings of U.S. Patent No. 5,817,562 issued to Chang et al., while this reference may disclose the step of patterning the polysilicon film containing an impurity forming a gate electrode, this reference clearly fails to overcome the aforementioned shortcomings associated with the prior art combination of Gardner et al. and Tanaguchi et al. Accordingly, it is respectfully submitted that applicant's claimed invention as set forth independent claim 1 as well as those claims which depend therefrom clearly distinguishes over the combination proposed by the Examiner and is in proper condition for allowance.

With reference to paragraph three of the Office Action, claim 2 has been rejected under 35 U.S.C. §103(a) as being unpatentable over the combination as applied in claim 1 and further in view of U.S. Patent No. 6,040,216 issued to Sung et al. This rejection is respectfully traversed in that the patent to Sung et al. neither discloses nor remotely suggest that which is presently set forth by applicants' claimed invention nor does such reference overcome the aforementioned shortcomings associated with the prior art combination applied to independent claim 1.

Initially, in that claim 2 is directly dependent on claim 1 and includes all the limitations thereof, it is respectfully submitted that this claim is likewise believed to be in proper condition for allowance for the reasons discussed in detail hereinabove.

Furthermore, while the patent to Sung et al may disclose that the silicon oxynitride film is formed using N_2O gas, this reference still fails to disclose or remotely suggest introducing nitrogen into the silicon oxynitride film after such film is formed as is specifically recited by applicants' claimed invention. Accordingly, respectfully submitted that applicant's claimed invention clearly distinguishes over the combination proposed by the Examiner.

With reference to paragraph four of the Office Action, claims 3 and 8 have been rejected under 35 U.S.C. §103(a) as being unpatentable over the combination as applied to independent claim 1 and further in view of U.S. Patent No. 6,246,091 issued to Rodder. Again, this rejection is respectfully traversed in that the patent to Rodder does nothing to overcome the

aforementioned shortcomings associated with the prior art combination proposed by the Examiner.

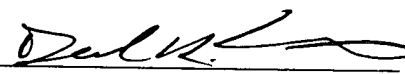
Initially, it is noted that each of claims 3 and 8 are directly or indirectly dependent upon independent claim 1 and include all limitations thereof. Accordingly, it is respectfully submitted that each of claims 3 and 8 are in proper condition for allowance for the reasons discussed in detail hereinabove.

Further, while the patent to Rodder may disclose forming an amorphous silicon film on the gate insulating film, as well as other details relating to the present invention, this reference still fails to overcome the shortcomings associated with the prior art combination noted above. Namely, this reference fails to disclose or remotely suggests introducing at least nitrogen into the silicon oxynitride film subsequent to its formation. Accordingly, it is respectfully submitted that applicant's claimed invention has set forth in each of claims 3 and 8 clearly distinguishes over the prior art of record and are in proper condition for allowance.

Therefore, in view of the foregoing respectfully requested that the objections of record be reconsidered and withdrawn by the Examiner, that claims 1-10 be allowed that the application be passed to issue.

Should the Examiner believe that a conference would be benefit in expediting the prosecution of the instant application he is hereby invited to telephone counsel to arrange such a conference.

Respectfully submitted,

By 
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